

1102-02 series Electric Rider Pallet Truck

# **Operating Instructions**

# Models ECR 30, ECR 40

1102-02 series ECR - 11028011640 rv03 US - 04/2020



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# **Proposition 65**

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2

Introduction	
Scope	2
Obligations of the Equipment Owner	2
Operator Responsibilities	3
Proper use	3
Hazard messages	4
Safety	
Before Operation	6
Operator Daily Checklist	6
Operating Position	7
Travel	7
Inclines, Ramps, Docks, Elevators	7
Parking	8
Battery Safety	8
Safety During Maintenance	10
Personnel Qualifications	10
Hazardous Substances	10
Operator Warning Decals	12
Data plate	12
Trained operator warning decal.	12
Test or service warning decal	12
Voltage decal	13
Order picking system decal	13
Overview	

3	Overview

Technical Description	16
Truck Components - Manual Steer	18
Truck Components - Electric Steer	19
Controls - Manual Steer	20
Controls - Electric Steer	21
Display Unit	22
Definition of Directions	23
Decal and Data Plate Location - Manual Steer	24



	Decal and Data Plate Location - Electric Steer	25
	Data Plate	26
4	Operation	
	Unloading and Preparing a New Truck for Operation	28
	Control Handle Tilt Adjustment (Manual Steer Trucks)	28
	Turning the Truck On and Off	29
	Driving	30
	Steering	32
	Hom	33
	Braking.	34
	Raising and Lowering the Forks	36
	Order Picking System (Optional equipment) - Manual Steer.	38
	Order Picking System (Optional equipment) - Electric Steer	40
	Connecting and Disconnecting the Battery	42
	Connecting the Battery to an External Charger	42
	Changing the Battery	44
	Towing the Truck	47
5	Maintenance	
	Personnel Qualifications	50
	Cleaning the Truck	50
	Operator Inspection and Maintenance	51
	Daily Inspection Overview	51
	Routine Lubrication and Inspection	53
	Routine Lubrication and Inspection Intervals.	53
	Minimum Lubrication and Inspection Intervals	53
		54 54
	Check for Gear Oil Leakage	54
	Check Lift Cylinder and Lines for Leaks	54
	Check Hydraulic Oil Level	54
	Check Drive Wheel and Fasteners	55
	Lubricate Drive Axle Swivel Bearing	56
	Lubricate Tie Bar Linkage	57



Lubricate Lift Cylinder and Fork Frame Pivots	58
Lubricate Caster Swivel Bearings	58
Lubricate Steering Gear (Electric steer only).	58
Scheduled Maintenance	59
General Maintenance Information	59
Maintenance Schedule	60
Fluid and Lubricant Specifications	61
Capacities	61
Troubleshooting	62
Fuses	62
Diagnostic Connector	63
Maintenance Intervals	63

## 6 Specifications

Specifications - Manual Steer	66
Specifications - Electric Steer	70

1

# Introduction

### Scope

# Scope

This manual contains operating and periodic maintenance instructions as well as specifications for the industrial truck to which it applies. If this manual applies to a trailer or other towed equipment, then operation or maintenance of the towing vehicle is outside the scope of this manual. Important safety rules and descriptions of some operating hazards and how to avoid them are also included. The manual is intended to assist the owner and operators in maximizing safety and efficiency in material handling while achieving maximum product life. It describes how to correctly and safely operate and maintain the truck and all standard variants available at the time of printing. Special designs, special attachments, or other custom modifications carried out by the manufacturer to meet specialized customer requests are not covered in this manual.

This manual is not a training manual and is not to be used as the basis for formal training. It is intended to supplement such training with information specific to this truck as well as applicable good practices and safety rules which may be general in nature. This manual cannot address every possible hazard or potential accident situation. Ultimately it is the responsibil-



ity of the owner and operator(s) of the equipment to avoid or correct such potential dangers.

To assist in keeping the truck in good operating condition, a separate section devoted to maintenance is included in this manual. This section contains a list of items to be checked daily by the operator. It also has a schedule for maintenance procedures to be performed at regular intervals by those responsible for truck maintenance. All of these procedures are essential for safe operation and maximum service life of the truck. Scheduled maintenance tasks or repairs must only be performed by gualified forklift technicians. Details and instructions for performing such work are outside the scope of this manual. This information is covered in the applicable service manual available from authorized dealers.

The descriptions and specifications included in this manual were in effect at the time of printing. KION North America Corporation reserves the right to make improvements and changes without notice and without incurring obligation. Please check with your authorized dealer for information on possible updates or revisions.

# Obligations of the Equipment Owner

The Occupational Safety and Health Administration (O.S.H.A.) requires employers of industrial truck operators to adhere to a number of regulations regarding operation. These regulations are codified in section 1910.178 of title 29 of the Code of Federal Regulations. This section establishes a number of specific rules pertaining to truck operation, inspection and maintenance, and areas of use. It is up to the owner to ensure that use and maintenance of any powered industrial truck is consistent with these rules.

In addition, 29 CFR 1910.178 describes required operator training in detail. It requires employers to establish and maintain a training program to ensure that all operators of powered industrial trucks are competent and trained in the safe and proper operation of powered industrial trucks.

Many of the rules set forth in 29 CFR 1910.178 are based on the American National Standards Institute's (ANSI/ITSDF) B56 standards. The owner should be familiar with 29 CFR 1910.178 as well as the ANSI/ITSDF B56 standards. Other federal standards may apply depending on specific industry. Owners should also be aware of any state OSHA rules that may differ from the federal rule. This equipment meets all applicable requirements of the ANSI/ITSDF B56 standards at time of manufacture. 29 CFR 1910.178 prohibits any modifications and/or additions which affect capacity or safe operation of industrial trucks without prior written approval of the



#### **Operator Responsibilities**

manufacturer. An owner should consult the authorized dealer if the owner's intended application for a truck is inconsistent with the designated performance characteristics of that truck. KION North America Corporation will not assume, and expressly disclaims, any liability for injuries or damages arising from or caused by unauthorized modification, removal, disconnection or disengagement of any part from any of its trucks. It is recommended that all replacement parts be of OEM (Original Equipment Manufacturer) origin.

ual. They must understand the potential haz-

ards and safety precautions covered in the

# **Operator Responsibilities**

It is the responsibility of the operator to operate any powered industrial truck in a safe manner. In order to do this, all operators must have completed training in the safe operation of powered industrial trucks. Operators must know and understand all general safety rules as well as any safety information specific to the environment in which they will be working. They must then practice these safe operating procedures whenever using a truck.

In addition, all operators must be familiar with the specific truck they use. Therefore they must be familiar with the procedures for correct and safe operation explained in this manmanual. This manual however, cannot cover all possible hazards. Operators must be able to identify any hazards that may exist or arise in their work environment and know how to avoid or correct them. Finally, operators are responsible for identify-

Finally, operators are responsible for identifying and reporting any truck that is in unsafe condition. They must know how to inspect the truck they operate and they must perform this inspection before placing a truck in service each day. Operators must not operate a truck found to be damaged or malfunctioning.

## Proper use

The truck is designed for lifting, transporting, and, if equipped with a mast, stacking of palletized or other stable loads. The maximum load to be lifted is specified on the truck data plate. The truck is not designed or intended to lift or transport personnel.

The truck may be operated outdoors or in buildings only on surfaces that are flat and stable. Transporting of loads on inclines and ramps is permitted if the incline surface is flat and stable. If the truck is equipped with a mast, the carriage must always remain in the fully lowered position during transport on such inclines and ramps. Lifting of loads or transport of elevated loads is prohibited on inclines and ramps. If the truck is operated on public roads it must be equipped with lights and any other devices as required by state or local law. If the truck is to be operated in refrigerated storage areas, it must be equipped with an optional cold storage package suitable for the specific application. (Not available on all models.) A truck must not be operated in any hazardous environment unless the truck carries the designation appropriate for that environment per 29 CFR 1910.178. It is the responsibility of the owner to ensure the safety of all operating areas and surfaces and to restrict the truck to the uses and areas for which it is designed and rated.

### Hazard messages



## Hazard messages

Hazard symbols and messages are placed in this manual and on the truck to provide instructions and identify specific areas where potential hazards exist and special precautions should be taken. Operators must understand the meaning of these symbols and messages. Damage to the truck, as well as serious injury or death to the operator or others may result if the instructions conveyed by these symbols and messages are not followed.

### 

Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury.

#### **WARNING**

Indicates a potentially hazardous situation which if not avoided could result in death or serious injury.

### A DANGER

Indicates an imminently hazardous situation which if not avoided will result in death or serious injury.



Indicates further information presented to ensure clarification of a particular item



#### ENVIRONMENT NOTE

The information contained herein must be observed, otherwise environmental damage may occur.

# 2

# Safety

### **Before Operation**

# **Before Operation**

Before using the truck, inspect the work area. It should be neat, well lit, adequately ventilated, and free from hazardous material. Aisles and roadways should be unobstructed and well marked.

Operators must know the UL classification for the truck and use the truck only in permissible areas.

Ensure that there are no loose objects on the truck or in the operator compartment, especially on the floor plate where they could interfere with pedal operation (if equipped) or foot room.

Fire extinguishers and other emergency equipment should be visible and easy to reach. Wear safety equipment when required. Don't smoke in "No Smoking" areas, or while charging batteries or refueling combustion engine trucks.

# **Operator Daily Checklist**

At the beginning of each shift, inspect your truck by using the Linde Operator's Daily Checklist. If necessary, refer to the Maintenance section of this manual for details on how to carry out this inspection. Check for damage and maintenance problems. Any necessary repairs must be completed before the truck is operated. In addition to daily inspection, scheduled maintenance is vital to safe operation of the truck. Adhere to the inspection, lubrication and maintenance schedule given in the Maintenance section of this manual. Note Any repairs or maintenance to the truck must be performed only by trained and authorized technicians.



Never operate the truck with greasy hands. This will make the controls slippery and result in loss of truck control.

Any questions or concerns about safety should be brought to the attention of a supervisor. If an accident should occur, it must be reported immediately.

#### **WARNING**

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Unauthorized modifications to the truck can result in injury or death.

Do not remove, disable or modify any safeguards or other safety devices. These include any alarms, lights, mirrors, overhead guards, and load backrest extensions. If present, an overhead guard is intended to provide protection to the operator from falling objects, but cannot protect from every possible impact.

iru Ioi	ck : ar n	Serial Number: Dept / Shift: teler reading: Date:				Operator: Supervisor:
Chi of a sel	ack iny ow	each of the following items before the start of each shi problem. Start at the front of the lift truck and work tow as necessary. Check boxes as follows: OK NR, Nee	ft. L ards ds R	et y the	rea air.	supervisor and/or maintenance department kno ir. After checking, mark each item accordingly. Expla Circle problem and explain below.
0 K	N R	VISUAL INSPECTION		0 K	N R	OPERATIONAL INSPECTION
_		Oil Spots on Floor (check for leaks on truck)				Unusual Noise (during any of the operational checks)
_		Drive Tire (wear, cuts, or embedded objects, rim damage,				Emergency Battery Disconnect (check operation)
		loose/missing lug nuts)				Gauges and Instrumentation (check operation)
		Hydraulic Oil (check level)				Battery Charge (fully charged)
		Steer Axle, Chain, or other mechanism (check for				Emergency Reverse Button (check operation)
		damage, debris)				Directional Switch (if equipped) (operates freely)
		Motor Covers (Loose fasteners, cracked or broken)				Operator Presence Switch (check operation)
		Steering: Control Handle(if equipped) (movement.		-	-	Forward Driving (accelerates, steers, brakes smoothly
		operation)		-	-	Plunning (store, changes direction smoothis)
-	-	Steering Wheel (I emigrad) (check for wear damage)		-	-	Reverse Driving (accelerates, steers, brakes smoothly
-	-	Throttle Hand Grins (Lenuirned) (check for year		-	-	Service/Parking Brake (check operation)
		damana)		-	-	Hudraulia Cantrals (monto fradu entre to pardial)
-	-	Asti alle Mat (if oppinged) (shock oppilizes obseriants)		-	-	Hudraufie Oil (openani neary, retain to hidrait)
-	-	Rattoni Connectore & Cobles (Among oracle, office)				injurance on (excessive ricker miller ricker are rany
-	-	Battan: Batantian (actual carried)		-	-	Hase (sounds when bother protocil)
-	-	Battery Cose & Mast case (domine constru-		-	-	Destroy Alexandra Miner Conten pressed)
		clanery case a vent capa (canage, caroos, cose,		_	-	Backup Alarm (il equipped) (sounds in reverse)
_	-	maang)		_	-	Travel Alarm (I equipped) (sounds with vehicle in motor
_	_	Fork Frame (damage. twist)				Work, Strobe, Flashing Lights (if equipped) (chec
_	-	Load wheels (the wear, damage, entrapped debris)		_	-	operation)
_		Warning Decals/Operator's Manual (in place, legible)		_		
_		Data Plate / Capacity Plate (in place, legible)				
_				_		
_						
_						
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1						
1						
xţ	ilan	ation of problems marked above (use back of this form	ifn	eec	led)	



# **Operating Position**

Face the truck when mounting and dismounting. Maintain a three-point contact, one foot and two hands with the truck when mounting or dismounting. Never exit a moving truck.

The normal operating position is defined as standing on the floor plate facing forwards with hands and feet inside the operator compartment on or near the controls.

#### **WARNING**

Risk of injury.

Operate the truck only when you are in the normal operating position. Always keep hands and feet inside the operator compartment during operation.

# Travel

The truck is designed for operation on smooth, dry surfaces such as warehouse and factory floors, loading docks or paved areas. Under all travel conditions operate the truck at a speed that will permit it to be brought to a stop in a safe manner. Avoid running over loose objects on the roadway surface.

#### **WARNING**

Loss of control!

Do not travel at excessive speeds; keep your truck under control at all times.

Always watch for pedestrians. When travelling in reverse (load end leading) be careful of drive end swing. The drive end of the truck will swing out if a turn is made while travelling in reverse. Always use caution when turning into an aisle. The load wheels can cut the corner sooner than expected.

Unstable loads are hazardous. Ensure all loads are secure and evenly positioned across both forks. Never lift a load with only one fork. Never carry anything on any part of the truck except the forks unless a specific area has been provided by the manufacturer.

During travel, always watch for overhead obstructions such as lights, wiring, pipes, sprinkler systems, doorways, etc. Never overtake another truck at an intersection, blind spot or other dangerous location. Use the horn at intersections and any location where visibility is limited.

# Inclines, Ramps, Docks, Elevators

If you must travel on an incline, do so with caution. Do not operate truck on a wet incline.

Keep the forks **upgrade** to maintain control when travelling up or down an incline with a **loaded** truck.

Keep the forks **downgrade** when travelling up or down an incline with an **empty** truck.

#### A DANGER

Tip-over will occur if you turn while travelling on a ramp or travel at an angle other than straight up or straight down a ramp.

Never turn on an incline or ramp either loaded or unloaded. Travel straight up or straight down.

Be aware that when descending an incline your stopping distance will be greater than when on a level surface. Reduce your speed, and ensure that there is adequate clear space at the bottom of the ramp to stop and turn.

To avoid hazards associated with a dock, you should personally check that the trailer brakes

# 2 Safety

### Parking

have been applied, wheel chocks are in place, and that any trailer-to-dock locking systems are being utilized. The impact of moving in and out of a trailer may cause the trailer to creep or move. Confirm that the driver will not move the trailer until you are done.

Do not drive the truck onto an elevator without specific authorization. Verify that the capacity of the elevator exceeds the weight of the truck and the weight of the load. Approach elevators slowly and ensure that the elevator car is level with the floor before entering. Enter elevators squarely with the load end leading. Ensure that no part of the truck or load contacts any part of the elevator other than the floor. Once on the elevator, neutralize the truck controls, shut off the power, and set the brakes. Any other personnel should leave the elevator before the truck is allowed to enter or leave.

Be especially cautious when driving the truck on ramps or bridge plates. Be sure to maintain a safe distance from each edge. Before driving the truck over a ramp or bridge plate, verify that its position is secured to prevent movement. Never exceed the rated capacity of a ramp or bridge plate.

# Parking

When you are finished with the truck, observe proper shutdown procedures.

- · Never park on a grade.
- Always come to a complete stop before leaving truck.
- · Place travel controls in neutral.
- Lower forks fully to the floor. If the forks can be tilted, tilt them forward.
- If the truck has a manual parking brake, apply it.
- Turn the truck off.
- If the truck has a key switch and the operator is more than 25 ft (7.5 m) away, or out of sight of the truck, the key should be removed.

# **Battery Safety**

### **A** WARNING

Batteries contain dissolved sulfuric acid, which is poisonous and caustic. Batteries also can produce explosive gases.

Remain aware of the following information.

#### 

Failure to properly shut down the truck may allow inadvertent movement and result in a collision.

Never park on a grade. Ensure the parking brake is applied and turn the truck off. On trucks with a direction switch, always place it in neutral.

#### 

Improper parking can interfere with emergency response.

Do not block stairways, main passageways or emergency routes. Do not block access to fire or emergency equipment.

- Wear protective equipment (protective apron and gloves) and protective glasses when working with battery acid. If clothing, skin or eyes come into contact with battery acid, immediately flush the affected areas with water. If acid contacts the eyes, seek medical attention at once. Clean spilled battery acid immediately with large amounts of water.
- Remove any metal rings, bracelets, bands, or other jewelry before working with or near batteries or electrical components.
- Never expose batteries to open flame or sparks.



8



- Areas in which batteries are stored or charged must be well ventilated to prevent concentration of explosive gases.
- If a battery is charged while installed in the truck, the battery cover must remain completely open during the entire charging period.
- Shorting of battery terminals can cause burns, electrical shock, or explosion. Do not

allow metal parts to contact the top surface of the battery. Make sure all terminal caps are in place and in good condition.

 Batteries may only be charged, serviced, or changed by properly trained personnel. Always follow all instructions provided by the manufacturers of the battery, charger, and forklift truck.

### Safety During Maintenance



# Safety During Maintenance

### **Personnel Qualifications**

Only qualified personnel authorized by the owner are permitted to perform maintenance or repair work. All items listed in the Scheduled Maintenance Charts must be performed by qualified forklift technicians only. They must have knowledge and experience sufficient to assess the condition of a forklift truck and the effectiveness of the protective equipment according to established principles for testing forklift trucks. Any evaluation of safety must be unaffected by operational and economic conditions and must be conducted solely from a safety standpoint.

Daily inspection procedures and simple maintenance checks, e.g. checking the hydraulic oil level or checking the fluid level in the battery, may be performed by operators. This does not require training as described above.

### **Hazardous Substances**

#### Oils



#### **WARNING**

Oils are flammable!

- Always comply with applicable legal regulations.
- Do not allow oil to come into contact with hot engine parts.
- Do not smoke in areas where oils are used or stored.



#### **WARNING**

Oils are toxic!

- Avoid skin contact, inhalation, or ingestion.
- If oil mist or vapors have been inhaled, seek fresh air.
- If oil comes into contact with the eyes, flush thoroughly (at least 10 minutes) with water and then seek medical assistance.
- If oil is swallowed, do not induce vomiting. Seek medical assistance immediately.



#### 

Prolonged intensive contact with the skin can result in loss of natural skin oils and irritate the skin.

- Avoid skin contact.
- Wear protective gloves, long sleeves, and eye protection.
- If oil contacts the skin, wash the affected area with soap and water.
- Change oil-soaked shoes or clothing immediately.

### A WARNING

Spilled oil presents a risk of slipping, particularly when combined with water.

Immediately treat spilled oil with an oil binding agent, and then dispose of it according to local regulations.

### 

All oils are potent contaminants of water.

- Recycle used oil if possible.
- Always store oil in appropriate containers.
- · Avoid spills.
- Spilled oil should be removed with oil-binding agents at once and disposed of according to local regulations.
- If recycling is not possible, dispose of used oil according to local regulations.



### Safety During Maintenance

### Pressurized Hydraulic Oil

#### A WARNING

Like other oils, hydraulic oil is flammable, toxic, and a skin irritant.

- Do not allow hydraulic fluid to come into contact with hot motor parts.
- > Avoid inhalation or skin contact of hydraulic oil.
- > Refer to the safety information under "Oils".

#### **A** WARNING

Hydraulic oil is pressurized during operation of the forklift truck and may remain pressurized after shut down. An escaping stream of pressurized hydraulic oil can cause serious injury.

- If pressurized hydraulic oil is found to be escaping from the truck, shut down the truck immediately and have the leak repaired before returning the truck to service.
- Only trained service personnel should attempt to repair any portion of the hydraulic system.
- Do not allow hydraulic fluid to come into contact with the skin.
- Avoid inhaling spray or mist created by escaping hydraulic oil.
- Penetration of pressurized fluids into the skin is particularly dangerous if these fluids escape at high pressure due to leaks in the hydraulic system. In case of such injury, immediate medical assistance is required.
- To help prevent injury, use appropriate personal protective equipment (e.g. protective gloves, long sleeves and industrial goggles).

### ENVIRONMENT NOTE

Hydraulic oil is a potent contaminant of water.

- Recycle used hydraulic oil if possible.
- Always store hydraulic oil in appropriate containers.
- Avoid spills.
- Spilled hydraulic oil should be removed with oil-binding agents at once and disposed of according to local regulations.
- If recycling is not possible, dispose of used hydraulic oil according to local regulations.

#### **Battery Acid**



#### A WARNING

Battery acid contains dissolved sulfuric acid. This is toxic.

- > Avoid contact and consumption.
- In case of injury, seek medical advice immediately.



#### 

Battery acid contains dissolved sulfuric acid. This is corrosive.

- When working with battery acid, always wear protective clothing and eye protection.
- Do not allow any acid to get onto clothing or skin or into the eyes; if this does happen, rinse immediately with plenty of clean water.
- In case of injury, seek medical advice immediately.
- Immediately rinse away spilled battery acid with plenty of water.



Dispose of used battery acid according to local regulations.

### **Operator Warning Decals**



# **Operator Warning Decals**

### Data plate

The data plate is designed to inform personnel of truck capacity and other important truck specifications. The operator should locate, read, and understand the data plate prior to using the forklift truck.

### A DANGER

#### Risk of tip-over.

Never attempt to lift a load greater than the maximum capacity listed on this plate.

### Trained operator warning decal

This decal states the requirement that only trained and authorized personnel are to operate truck.





MISUSE OF THIS TRUCK COULD CAUSE INJURY TO YOURSELF OR OTHERS WORKING WITH YOU.

READ INSTRUCTIONS IN OPERATOR'S MANUAL.

0009384608

### Test or service warning decal

This decal gives important safety information for personnel servicing or testing the truck.

### ⊳

⊳

#### WARNING

BEFORE PERFORMING ANY TEST OR SERVICE WHICH CALLS FOR TESTING UNDER POWER, JACK THE DRIVE WHEELS OF THE TRUCK OFF THE FLOOR. THE DRIVE WHEELS MUST BE FREE TO TURN. ENSURE THE TRUCK IS SECURELY BLOCKED.

DO NOT USE TEST DEVICES OR SYSTEMS ANALYZERS IN PLACE OF CONTROL BOARDS OR CONTROL MODULES TO DRIVE THE TRUCK. ATTEMPTS TO DRIVE WITH TEST DEVICES OR ANALYZERS ARE HIGHLY DANGEROUS.



Α

**Operator Warning Decals** 

### Voltage decal

This decal indicates the proper battery voltage for the truck's electrical system. Using a battery of wrong voltage could damage the truck.



### Order picking system decal

This decal warns the operator to note characteristics of the optional order picking system. If present, this decal will be located on the control handle for manual steer trucks or on the sides of the load backrest for electric steer. When this order picking system is activated, the brake will not automatically engage. On manual steer models, the truck may be jogged forward with the grey levers located on the inside of the control handle grip area. On electric steer models, the truck may be jogged forward or backward using the arrow buttons on either side of the truck. If the truck is not equipped with the order picking system, this decal will not be present.

#### Manual steer and electric steer order picking system decals



⊳

# 2 Safety

**Operator Warning Decals** 



3

# Overview

### **Technical Description**



# **Technical Description**

### General

The 1102-02 series of trucks are electric rider pallet truck models. (ITA class 3). They are designed for handling loads up to:

6000 pounds (2.7 metric tons) for ECR 30

8000 pounds (3.6 metric tons) for ECR 40

This capacity may be downrated in special circumstances. Exact capacity limits for individual vehicles are found on the data plate.

### Drive unit

The drive unit is comprised of a 24-volt brushless AC drive motor mounted vertically to a reduction gear unit. The drive unit pivots in the chassis to determine drive wheel direction. An electro-mechanical brake is installed at the top end of the drive motor. The brake engages whenever the vehicle is stationary and when the truck is switched off.

### Travel control

Travel speed and direction is controlled through a twist grip travel control at the top of the control handle. When the travel control is released, the truck will decelerate via regenerative braking. More aggressive slowing is available by rotating the travel control in the opposing direction. The degree of braking for both of these functions is adjustable in the truck control software.

### Hydraulic system

The hydraulic system utilizes fluid pressurized by a hydraulic pump driven by a DC pump motor. The pump motor is part of an integrated hydraulic pump unit which also contains the pump, a manifold block, a lowering solenoid valve, and a hydraulic oil reservoir. During lifting, pressurized hydraulic fluid from the pump is routed through a check valve to a lift cylinder. The lift cylinder operates the tie bar linkage to elevate the forks. Lowering occurs by gravity when the lowering solenoid is activated. The weight of the forks (and any load) then acts through the linkage to force hydraulic fluid out of the cylinder and back to the reservoir.

### Steering system

Manual or electric steering variants are available.

On manually steered trucks, the control handle is mechanically connected to the drive unit through a solid bar. Manual force is therefore directly applied to pivot the drive wheel.

Electric steering is accomplished through a brushless AC electric motor geared to the drive unit through a ring and pinion. The electric steering motor is controlled by a dedicated transistorized motor controller. The controller compares control handle position to motor position and operates the motor as necessary to track the handle position as it is moved by the operator.

### Load lifting system

Load on the forks is elevated through a hydraulically activated linkage. The linkage consists of a lift shaft at the base of the battery compartment connected through tie bars to toggles at each load wheel. The lift shaft is rotated by the hydraulic lift cylinder described previously.

### Electrical system

The truck is equipped with a 24-volt electrical system. A single line contactor controls power to the system once the key switch is on. All travel and lift function is controlled by a transistorized main controller. The main controller contains both control logic and an array of power transistors for the drive motor. The control logic processes signals from sensors, interlocks, and operator controls and generates the appropriate release and speed signals to the power transistors to operate the drive motor. One fuse for the power circuit is present. A number of control fuses are used for the remainder of the system and certain options. A



### **Technical Description**

diagnostic connector is provided in the wiring harness to connect a handset or laptop com-

puter to the controller for diagnostics or adjustment of certain performance parameters.



### Truck Components - Manual Steer

# Truck Components - Manual Steer



- 1 Control handle
- Battery connector
- Dash
- Operator compartment
- Operator backrest cushion
- 234567 Load backrest
- Accessory tray (optional)

- Operator manual storage
- 9 Load wheels
- 10 Forks
- 11 Floor mat
- 12 Battery
- 13 Battery retainer (with optional rollers)
- Front bumper 14



**Truck Components - Electric Steer** 

# **Truck Components - Electric Steer**



- Control head 1
- Battery connector
- 2 3 4 5 6 Operator console
- Operator compartment
- Operator backrest cushion
- Load backrest
- 7 Accessory tray (optional)
- 8 Operator manual storage

- Load wheels
- 9 10 Forks
- Floor mat 11
- 12 Battery
- 13 Battery retainer (with optional rollers)
- Front bumper 14
- Storage compartment 15



#### **Controls - Manual Steer**

# **Controls - Manual Steer**



- Control handle angle adjustment lever 1
- Key switch
- Accessory switches (optional)
- Indicator unit
- 2 3 4 5 6 Horn button
- Brake button
- 7 Order pick system indicator light (optional)
- 8 Travel control

- Order pick system button (optional)
- 10 Lever switches for optional order picking system
- 11 Lowering button
- 12 Lift button
- 13 Auxiliary lift button (optional)
- 14 Auxiliary lowering button (optional)



**Controls - Electric Steer** 

# **Controls - Electric Steer**



- Operator console 1
- 2 Brake button
- 3 4 5 Travel control
- Lift/Lower rocker control
- Horn button
- 6 Accessory switches (optional)
- 7 Indicator unit
- Key switch 8

- Console release knobs
- Auxiliary lift button (optional) 10
- 11
- Auxiliary lowering button (optional) Order pick forward jog button (optional) 12
- 13 Order pick reverse jog button (optional)
- 14 Auxiliary horn button (optional)
- Order pick system control switch (optional) 15

# **Display Unit**



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The indicator unit is located beside the key switch. It displays accumulated hours, battery state of charge, and fault codes. When the key is first switched on, the red fault LED will briefly light. If there are no faults, accumulated hours and battery state of charge are then displayed throughout truck operation.

Fault indicator (red) (1) Lights when a fault is present. (This also occurs when a programmed maintenance interval has been reached.)

Truck On indicator (green) (2) Lights when the truck is switched on.

Battery discharge indicator segments (3) Shows the current charge state of the battery.

The discharge status of the battery is represented by ten segments. These segments go out successively as the battery becomes increasingly discharged. All ten segments are visible if the battery is greater than 90% charged. As the battery discharges, the segments will go out from right to left. The last segment will flash as the battery approaches complete discharge.

**Service due icon (4)** Appears when the next service interval is within a programmed range. The icon will flash when the next service interval is actually reached. Truck performance

may be limited based on preferences set in the truck program.

# Operating hours (5) and fault code display (6)

When the key is switched on, the accumulated operating hours are displayed to the nearest tenth. The hour meter accumulates time only when the drive motor or pump motor is operating. The decimal point will flash when the truck is accumulating hours. If a fault is present in the truck, the display will alternate between the associated fault code and the hour meter value. If more than one fault code is active, each fault code will be successively displayed.

Faults involving the start-up sequence (handle or throttle out of position at start-up) will clear automatically when the handle or throttle is returned to the proper position. Other faults will require the key switch to be turned off and then back on after the fault condition is corrected in order to clear the fault from the display.

Fault code icon (7) Appears whenever a fault is active.

Temperature icon (8) Appears if the truck controller temperature exceeds 185 °F (85C).



### **Definition of Directions**

# **Definition of Directions**

- (1) Forwards
- (2) Right
- (3) Reverse
- (4) Left

Directions as seen from the driving position; operator facing forward (1).





### Decal and Data Plate Location - Manual Steer

# Decal and Data Plate Location - Manual Steer



1 C	ata plate	
-----	-----------	--

- Warning Decal, Trained Operator 2
- 3 Plate, UL Classification
- Decal, Operator Manual Location 4 5
- Warning Decal, Service Work

Decal, Voltage

6 7

8

9

- Warning Decal, Order Pick System (optional)
- Cold Storage Decal (optional)
- EE Designation Decal (optional)



Decal and Data Plate Location - Electric Steer

# **Decal and Data Plate Location - Electric Steer**



- 1 Data plate
- Warning Decal, Trained Operator Plate, UL Classification 2
- 2 3 4
- Decal, Operator Manual Location
- 5 Warning Decal, Service Work

- 1102-02 10262018-02 rv02
- 6 Decal, Voltage 7
  - Warning Decal, Order Pick System (optional)
- 8 Cold Storage Decal (optional)
- 9 EE Designation Decal (optional)



### Data Plate

# Data Plate



- (1) **MODEL** shows the model designation of the truck.
- (2) SERIAL No./Year shows the serial number and year of manufacture of the individual truck.
- (3) ASSEMBLED IN shows the country in which the truck was originally manufactured.
- (4) TRUCK WEIGHT shows the weight of the truck (in pounds and kilograms) with forks. This weight does not include the battery on electric trucks.
- (5) BATTERY VOLTAGE (electric trucks only) – shows the system voltage of the truck.
- (6) AMP-HR MAX (electric trucks only) shows the maximum current capacity in amp-hrs for any battery to be used in the truck.
- (7) BATTERY TYPE (electric trucks only) – shows the required battery designation, as outlined in ANSI B56.1. A battery of the correct designation must be installed in order for the TRUCK TYPE designation to be valid.
- (8) BATTERY WEIGHT (electric trucks only) – shows the allowable weight range (MAX and MIN) for the battery in pounds and kilograms.

- (9) **BACK TILT** shows the maximum angle that the mast can be tilted back.
- (10) LIFT TYPE shows a letter corresponding to the type of mast construction as follows:
  S for single masts
  D for double masts
  T for triple masts
  Q for quad masts
- (11) **(Diagram)** illustrates the dimensions A, B, C, and D used in CAPACITY chart (14).
- (12) **DRIVE TIRES** shows the required size and type of drive tire.
- (13) TRUCK TYPE shows the designation of the truck with respect to hazardous environments as outlined in 29CFR1910.178. This designation corresponds to the environment(s) in which the truck is approved for use.
- (14) CAPACITY shows the maximum load weight (in pounds and kilograms) that can be safely lifted for the corresponding devices listed under AT-TACHMENT(S). In order to achieve a listed capacity safely, the lift height must be kept within the corresponding value shown in column C and the load center of gravity must be within the corresponding values shown in columns A, B, and D.

4

# Operation

## 4 Operation



### Unloading and Preparing a New Truck for Operation

# Unloading and Preparing a New Truck for Operation

When unloading a new truck, it may be necessary to tow or lift the truck. See the corresponding sections in this manual for instructions regarding towing or lifting.

Before placing a new truck into service, perform the Daily Maintenance Inspection as found in the Maintenance section.

The truck can then be operated at full speed immediately upon being placed in service. However, during the first 50 operating hours, avoid subjecting the drive motors or hydraulic system to high continuous loads.

### **WARNING**

Wheel mounting hardware sometimes requires several cycles of tightening before it fully seats. For this reason, wheel mounting screws or nuts will often work loose in the period immediately following initial tightening.

When placing a new truck into service, the wheel mounting screws or nuts must be checked for tightness every 10 hours until no further loosening is detected. See the procedure for checking the drive wheel in the Maintenance section.

# Control Handle Tilt Adjustment (Manual Steer Trucks)

The control handle angle may be adjusted to suit the operator. The angle position is locked or unlocked at the adjustment lever (1) on the left side of the handle arm.

# 

The adjustment lever (1) may be pulled out slightly and rotated to any position that is most convenient for operation.

- Turn the tilt adjustment lever counter-clockwise to unlock the tilt mechanism.
- Manually tilt the control handle arm to the desired angle.
- Turn the tilt adjustment lever clockwise to hold the desired angle. Tighten the lever firmly to lock the tilt mechanism.

#### 

If the tilt locking mechanism becomes loose during operation, it could interfere with the operator's ability to control the truck.

Ensure that the tilt adjustment lever (1) is completely and firmly tightened clockwise before operating the truck.


#### Turning the Truck On and Off



## Turning the Truck On and Off

#### Switching the truck on

To turn the truck on, make sure the travel control is released to the neutral position. Turn the key switch clockwise. The green light on the indicator unit should come on. The red light should come on briefly. This is then followed by the battery charge state and the accumulated operating hours on the truck. Battery charge and operating hours are displayed continuously from this point on until the key switch is turned off.

The truck is equipped with a static-return-toneutral function. If the travel control is out of the neutral position at start-up, a fault code will be displayed and the red fault indicator will come on. This fault may be cleared by releasing the travel control.

Also, if any lift or lower button, or the braking button is held in at start-up, then an out-of-sequence fault (and red light) will be displayed depending on which button is causing the fault. Correcting the fault condition will clear the fault unless the braking button was held in at start-up. In this case, the key switch must be turned off and back on to clear the fault and enable operation.

The truck is equipped with an operator presence switch beneath the floor plate. The truck may be turned on without this switch activated, but weight must be on the floor plate to enable travel or hydraulic function. If the truck is equipped with the optional order picking system, weight must remain off of the floor plate for that system to function.

#### Switching the truck off

To turn the truck off, turn the key switch counter-clockwise to the vertical position. The indicator unit display will turn off.

#### 4 Operation

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**WARNING** 

Operators must be familiar with all safety procedures that apply to forklift operation before driving.

Read and understand all safety information in Section 2 before operating the truck.

Forward is defined as forks trailing. Reverse is defined as forks leading. See section three if necessary.

Manual steer controls are illustrated in panel A. Electric steer controls are illustrated in panel B. The procedure is the same for either variant

- > Switch the truck on. See "Turning the truck on and off" if necessary.
- > Ensure correct position in the operator compartment with both feet on the floor plate.
- Raise the fork arms so that any load is clear of the ground.

#### Forward Motion

Twist the travel control (1) so that it rotates in the direction shown (2).

The truck will move forward. The speed is proportional to the amount of control rotation. Always keep both hands on the control handle while driving.

#### Reverse

> Twist the travel control so that it rotates in the direction shown (3).

The truck will move in reverse. The speed is proportional to the amount of control rotation. Keep two hands on the control handle during reverse operation.

### Changing Direction

> To change direction at any time during travel, release the travel control and rotate it in the opposite direction. This can be done while the truck is still moving in the original direction. The truck will be electrically





Driving

braked to a stop and then begin moving in the new direction.

#### **Operator Presence Switch**

The truck is equipped with an operator presence switch. If weight is removed from the floor plate during travel, the truck will stop. Weight must then be restored to the floor plate and the throttle returned to neutral before travel will be restored.

#### Steering

Steering



Steering the truck is done using the control handle. Manually moving it to the left or right will swivel the drive wheel. The truck then turns in forward or reverse according to the handle direction.

An optional electric steering system is available which provides reduced steering effort. If this system is present, steering is only possible when the truck is switched on and functioning properly.

Manual steer controls are illustrated in panel A. Electric steer controls are illustrated in panel B.





Horn

Horn

Press the horn button (1) on the control handle to sound the horn.

Manual steer controls are illustrated in panel A. Electric steer controls are illustrated in panel B. The procedure is the same for either variant.

On electric steer trucks that are equipped with the optional order picking system, additional horn buttons (2) are provided in the button group on both sides of the load backrest. Either button will sound the horn.



#### Braking



The truck has electric braking built in to the motor control equipment and an electromagnetic parking brake on the drive unit. Electric braking is controlled by the position of the travel control (1). The parking brake is activated separately by the truck controller. Emergency electric braking is available with the brake button (2).

Manual steer controls are illustrated in panel A. Electric steer controls are illustrated in panel B. Braking behavior is the same for either variant.

### **Electric Braking**

There are two modes of electric braking. The first mode activates when the travel control is eased towards the neutral position. The second mode activates if the travel control is rotated toward the opposing direction. The braking force is greater with the second mode than with the first. The second mode is sometimes referred to as "plugging". Both modes are regenerative and therefore convert truck momentum back into energy to recharge the battery. The amount of braking force that occurs in each of these modes is adjustable in the truck control program.

While travelling, release the travel control (1).

The truck will slow to a stop depending on the setting of the electric brake function.



Slow or quick release of the travel control into the neutral position allows the braking action to be sensitively controlled, from gentle to hard braking.

While travelling, rotate the travel control toward the opposite direction until the truck has been electrically braked to a stop.

The truck will slow to a stop faster than if the travel control is simply released. After stopping, the truck will accelerate in the new direction unless the travel control is then released.





#### **Parking Brake**

Whenever the travel control is released, the parking brake is applied automatically once truck speed drops below a pre-set creep speed for a programmed amount of time. Also, the parking brake is applied immediately whenever power is switched off or lost. For normal operation on flat surfaces, the truck will become stationary before the brake sets. If the truck is on an incline, it will creep down the incline until the time delay expires and sets the brake. Always switch the truck off if it must be stopped on an incline. This will immediately engage the parking brake.

#### **Emergency Stopping**

Pressing the brake button (2) at any time during operation will activate maximum electric braking and disable the travel controls. The truck will stop abruptly. The truck must then be turned off and back on with the key switch to continue use.

If necessary, the parking brake may be activated in an emergency by disconnecting the battery or turning the key switch off.

Raising and Lowering the Forks



# Raising and Lowering the Forks

#### A WARNING

When lowering the forks, feet can become pinched against the floor.

Make sure all personnel are clear of the forks before lowering them.

Raising and lowering operation varies slightly between manual and electric steer trucks. On both types, the operator must be standing in the operator compartment with both feet on the floor plate to enable lifting or lowering.

#### **Manual Steer Models**

Raising and lowering of the forks is controlled through buttons on the control handle. To raise the forks, press either lift button(1). To lower the forks, press either lowering button (2). Note the symbols on the buttons.



#### **Electric Steer Models**

Raising and lowering of the forks is controlled through a lift/lower rocker button in the center of the control head. To raise the forks, press the upper portion of the rocker button(1). To lower the forks, press the lower portion of the rocker button (2). Note the symbols on the buttons.





#### Raising and Lowering the Forks

## Auxiliary Lift/Lower Buttons (Optional equipment)

Auxiliary lift and lower buttons are available as an option. If present, they are located at the top corner of the operator backrest cushion on both sides of the truck. Lift (1) and lower (2) function is identical to the buttons in the control handle. The auxiliary lift/lower buttons are available on both manual and electric steer trucks.

#### **Operator Presence Switch**

The truck is equipped with an operator presence switch. If weight is removed from the floor plate during lifting or lowering, operation will stop. Weight must be restored to the floor plate before hydraulic function will be restored.



### 4 Operation



#### Order Picking System (Optional equipment) - Manual Steer

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## Order Picking System (Optional equipment) - Manual Steer

The truck may be equipped with an optional order picking system. This system is intended to allow efficient movement of the truck for short distances during order picking activities where materials are placed on or removed from the truck. The lever switches on each inner side of the control handle can then be used to move the truck forward slightly without having to twist the travel control. Before these features will function, the system must be activated by pushing either of two activation buttons on the control handle. Whenever the system is active, a yellow indicator light on the handle arm will turn on.

To use the system, step off the truck and push the activation button (1). Confirm that the yellow indicator (2) comes on.

#### A WARNING

When the lever switch is released, the truck will coast to a stop.

Before moving the truck, ensure that there is adequate room for the truck to coast to a stop.

#### **WARNING**

Allowing the truck to travel unattended can cause injury if personnel or equipment are in its path.

Always remain with the truck until it comes to a complete stop. Watch for personnel or equipment entering the path of the truck. To stop the truck, release the grey lever switch or travel control.

To move the truck forward, stand to one side of the truck and press either grey lever switch(3) on the inside of the control handle. The truck will move forward as long as the lever is held (up to a programmed time limit). The truck will coast to a stop when the lever is released. If the time limit is reached, the lever must be released and pressed again to continue movement. This operation allows movement of the truck between pick locations with greater convenience than the twist action of the travel





#### Order Picking System (Optional equipment) - Manual Steer

control. The travel control will still operate normally and can be used to move the truck in forward or reverse at any time if required. The control handle may be used to steer the truck as necessary.

When finished with order picking activities, turn the order picking system off by stepping onto the floor plate. The system will automatically disengage any time weight is placed on the floor plate. Verify that the light (2) goes out. When the system is off, travel using the lever switches is disabled. To turn the system back on, exit the truck and press the system activation button again. The system will also disengage whenever the brake button is activated, or if the truck is turned off with the key switch. The activation button (1) will not turn the system off.

#### A WARNING

Riding the truck with the order picking system engaged can cause accident and injury.

Never ride the truck with the order picking system engaged. Always stop the truck and dismount before engaging the order picking system.

#### A WARNING

Use of the order picking system on an incline can result in longer coasting distances.

Do not operate the truck on an incline with the order picking system active.



### 4 Operation

#### Order Picking System (Optional equipment) - Electric Steer

## Order Picking System (Optional equipment) - Electric Steer

The truck may be equipped with an optional order picking system. If so, the order picking system button group (1) to (4) will be present on each side of the truck. The order picking system is intended to allow efficient movement of the truck for short distances during order picking activities where materials are placed on or removed from the truck. The system is designed to allow safe truck movement from a position outside the operator compartment. The direction buttons (3) or (4) on either button group can then be used to move the truck forward or backward slightly without having to twist the travel control. Before these features will function, the system must be activated by pushing the system activation button (1) on either button group. Whenever the system is active, the activation button will light.

To use the system, step off the truck and push the activation button (1). Confirm that the button lights. The system will not activate with weight on the floor plate.

#### **WARNING**

When a direction button is released, the truck will coast to a stop.

Before moving the truck, ensure that there is adequate room for the truck to coast to a stop.

#### A WARNING

Allowing the truck to travel unattended can cause injury if personnel or equipment are in its path.

Always remain with the truck until it comes to a complete stop. Watch for personnel or equipment entering the path of the truck. To stop the truck, release the direction button or travel control.

To move the truck, stand to one side of the truck and press either direction button (3) or (4) on the button group. The truck will move in the selected direction as long as the button is held (up to a programmed time limit). The truck will coast to a stop when the button is released. If the time limit is reached,





#### Order Picking System (Optional equipment) - Electric Steer

the button must be released and pressed again to continue movement. The direction buttons allow movement of the truck between pick locations with greater convenience than the twist action of the travel control. The travel control will still operate normally and can be used to move the truck in forward or reverse at any time if required. The control handle may be used to steer the truck as necessary.

When finished with order picking activities, turn the order picking system off by pushing the system activation button. Verify that its light goes out. The system may also be turned off by stepping onto the floor plate. The system will automatically disengage any time weight is placed on the floor plate. When the system is off, travel using the direction buttons is disabled. To turn the system back on, exit the truck and press the system activation button again. The system will also disengage whenever the brake button, or emergency stop button is activated, or if the truck is turned off with the key switch.

#### **WARNING**

Riding the truck with the order picking system engaged can cause accident and injury.

Never ride the truck with the order picking system engaged. Always stop the truck and exit before engaging the order picking system.

#### **WARNING**

Use of the order picking system on an incline can result in longer coasting distances.

Do not operate the truck on an incline with the order picking system active.

## 4 Operation



# Connecting and Disconnect-

The battery is connected and disconnected at the battery connector (1) on the right-hand side of the chassis. The battery connector also serves as an emergency disconnect if necessary.

Manual steer is illustrated in panel A. Electric steer is illustrated in panel B. The procedure is the same for either variant.

#### **Connecting the Battery**

- Ensure the key switch is off.
- Align the battery connector halves and push them together. The battery will be connected and the truck may be switched on.

#### **Disconnecting the Battery**

- > Turn the key switch off.
- Grasp the battery connector (1) and pull it apart. Place the loose cable on the battery to guard against damage.

# Connecting the Battery to an External Charger

#### **WARNING**

Specialized training is required to charge batteries safely.

Batteries may only be charged by properly trained personnel in accordance with the instructions of the charger manufacturer and the following procedure.

#### **WARNING**

Explosive gases are released during battery charging.

Charge batteries only in well ventilated areas.

- > Park the truck safely.
- > Turn off the key switch.
- > Remove the accessory tray if equipped.
- Open the battery cover.







#### Connecting the Battery to an External Charger

#### **A** WARNING

Dangerous concentrations of explosive gases can occur during battery charging if the battery cover is not open.

The battery cover must be left completely open during the entire charging period to allow ventilation.

- > Unplug the battery connector.
- Attach the battery connector on the battery cables to the connector plug of the external battery charger.
- Charge the battery in accordance with the charger manufacturer's instructions.

#### Changing the Battery



## Changing the Battery

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Specialized training is required to handle batteries safely.

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Batteries may only be changed by properly trained personnel in accordance with the instructions of the battery manufacturer and the following procedure.

The battery can be changed in various ways:

- Using a crane (taking care to stay within the permissible load carrying capacity of the crane and the lifting gear)
- Using an additional truck (taking care to stay within the permissible load carrying capacity of the truck)
- Using specialized side extraction equipment if the truck is equipped with the optional battery roller tray.

#### 

If any lifting equipment (forklift trucks or other lifting equipment) used to change a battery has insufficient load carrying capability and/or forks whose length is too short, there is a risk of accidental injury or death.

Use only equipment of sufficient size and load carrying capability to change batteries.

Manual steer components are illustrated in panel A. Electric steer components are illustrated in panel B. The procedure is similar for either variant.

- > Park the truck safely.
- Disconnect the battery at the battery connector (1).
- Remove the optional accessory tray (2) if equipped.
- On manual steer trucks, turn the control handle (3) all the way to one side or the other to gain clearance over the battery. This step is not necessary if using side extraction equipment.







#### Changing the Battery

On electric steer trucks, unlock the console tilt mechanism at the release knobs (3B) and tilt the console (3A) rearward (arrow). This step is not necessary if using side extraction equipment.

#### A WARNING

Shorting of battery terminals can cause burns, electrical shock, or explosion.

Do not allow metal parts to contact the top surface of the battery. Make sure all terminal caps are in place and in good condition.

- Using a crane or another truck, carefully move the lifting gear into position over the battery. If using side extraction equipment, position it according to the manufacturer's instructions.
- Insert the hooks of the lifting gear into the openings provided for this purpose in the battery carrier. If using side extraction equipment, attach it according to the manufacturer's instructions.
- Carefully lift the battery until it clears the side wall (4) of the battery compartment and move it slowly out of the truck chassis. If the truck is equipped with the optional battery rollers, remove the battery retainer (5) on the side from which the battery is to be removed. The battery may then be rolled out of the battery compartment without lifting.
- Check the battery for leaking acid, cracked housing or raised plates.
- Check that the battery plug and cable are in good condition and leave the battery in a safe place.

#### **WARNING**

Batteries of incorrect size or weight can reduce traction and braking ability.

Install only batteries whose weight meets the specification listed on the truck data plate.

Carefully position the replacement battery in the battery box. Disconnect and remove all lifting equipment.



## 4 Operation

#### Changing the Battery

If the truck is equipped with battery rollers, replace the battery retainer plate.

#### **WARNING**

On trucks equipped with battery rollers, an unsecured battery can roll out of the truck during operation and cause severe injury.

Ensure that both battery retainer plates are in place before operating the truck.

- Plug the battery plug into the battery connector socket (1).
- > Replace the accessory tray if equipped.
- Return the handle or console to the operating position. For electric steer trucks, ensure the console is securely locked in the vertical position.

#### **WARNING**

Batteries produce explosive gases.

Always store batteries in well ventilated areas.





## Towing the Truck

#### **WARNING**

When the truck is not in use, the parking brake will remain applied (even when power is on) and the drive wheel will not turn.

To prevent damage from dragging the drive tire, always ensure that it is clear of the ground when towing.

- Remove any load from the forks before towing.
- If the hydraulic system is functional, raise the forks.
- Attach towing equipment to the front bumper of the chassis. Towing equipment must be capable of lifting the front of the truck enough for the drive tire to clear the ground.

#### A WARNING

The control handle will be damaged if towing equipment is attached to it.

Never tow the truck by the control handle.

Lift the front of the truck enough for the drive tire to clear the ground but not so much that the fork tips drag. The truck may then be towed.

## 4 Operation

Towing the Truck



5

## Maintenance

#### **Personnel Qualifications**

## **Personnel Qualifications**

Only qualified personnel authorized by the owner are permitted to perform maintenance or repair work. All items listed in the Scheduled Maintenance Charts must be performed by qualified forklift technicians only. They must have knowledge and experience sufficient to assess the condition of a forklift truck and the effectiveness of the protective equipment according to established principles for testing forklift trucks. Any evaluation of safety must be

## **Cleaning the Truck**

The need for cleaning depends on use of the truck. If highly aggressive media are involved, e.g. salt water, fertilizer, chemicals, cement etc., thorough cleaning is required after finishing the work assignment.

Hot steam or cleaning materials with a powerful degreasing effect should only be used with great caution as this will affect the grease filling of bearings with lifetime lubrication, causing it to escape. As re-lubrication is not possible, the bearings will be irreparably damaged.

When using compressed air for cleaning, remove stubborn soiling with cold cleaner.

During cleaning pay special attention to the oil filler openings and the surrounding areas as well as the lubricating nipples prior to greasing.

Run the truck immediately after cleaning to check operation and to aid in drying in case any motors became exposed to moisture.



Daily inspection procedures and simple maintenance checks, e.g. checking the hydraulic oil level or checking the fluid level in the battery, may be performed by operators. This does not require training as described above.

#### **A** CAUTION

Never wash truck when switched on.

Switch the truck off and disconnect the battery before any cleaning operations.

#### **A** CAUTION

When cleaning with a water jet (high-pressure or steam cleaner etc.), it should not be applied directly to the drive unit, any electric or electronic components, connector plugs or insulating material. High pressure water also should not be applied directly to the operator controls on the control handle.

If this is unavoidable, the parts concerned should be covered up beforehand or only cleaned with a dry cloth or clean compressed air.





#### **Operator Inspection and Maintenance**

## **Operator Inspection and Maintenance**

### **Daily Inspection Overview**

ru	Terrah Osciel Number				Onoratori	
Hοι	ска Jrm	beter reading: Dept / Shift: Date:			Operator: Supervisor:	
Che of a belo	eck iny ow a	each of the following items before the start of each shift problem. Start at the front of the lift truck and work tows as necessary. Check boxes as follows: OK NR, Neec	t. Let y ards the	<b>/oui</b> e rea air.	r supervisor and/or maintenance department kno ar. After checking, mark each item accordingly. Expla Circle problem and explain below.	
0 K	N R	VISUAL INSPECTION	0 K	N R	OPERATIONAL INSPECTION	
		Oil Spots on Floor (check for leaks on truck)			Unusual Noise (during any of the operational checks)	
		Drive Tire (wear, cuts, or embedded objects, rim damage.			Emergency Battery Disconnect (check operation)	
		loose/missing lug nuts)			Gauges and Instrumentation (check operation)	
		Hydraulic Oil (check level)			Battery Charge (fully charged)	
		Steer Axle, Chain, or other mechanism (check for			Emergency Reverse Button (check operation)	
		damage, debris)			Directional Switch (if equipped) (operates freely)	
		Motor Covers (Loose fasteners, cracked or broken)			Operator Presence Switch (check operation)	
		Steering; Control Handle(if equipped) (movement,			Forward Driving (accelerates, steers, brakes smoothly)	
		operation)			Plugging (stops, changes direction smoothly)	
		Steering Wheel (if equipped) (check for wear, damage)			Reverse Driving (accelerates, steers, brakes smoothly)	
		Throttle Hand Grips (if equipped) (check for wear,			Service/Parking Brake (check operation)	
		damage)			Hydraulic Controls (operate freely, return to neutral)	
		Anti-slip Mat (if equipped) (check condition, cleanliness)			Hydraulic Oil (excessive noise when forks are fully	
		Battery Connectors & Cables (damage, cracks, pitting)			raised is indication of low hydraulic oil)	
		Battery Retention (installed correctly, secure)			Horn (sounds when button pressed)	
		Battery Case & Vent caps (damage, cracks, loose,			Backup Alarm (if equipped) (sounds in reverse)	
		missing)			Travel Alarm (if equipped) (sounds with vehicle in motion	
		Fork Frame (damage. twist)			Work, Strobe, Flashing Lights (if equipped) (chec	
		Load wheels (tire wear, damage, entrapped debris)			operation)	
		Warning Decals/Operator's Manual (in place, legible)				
		Data Plate / Capacity Plate (in place, legible)				
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Exp	lan	ation of problems marked above (use back of this form	if need	ded)	:	

## 5 Maintenance



The following inspection tasks in this section should be carried out by the operator or designated service personnel before each shift or at least daily. This inspection is not part of the regularly scheduled maintenance listed elsewhere in this chapter and is not intended to replace any of it. Regularly scheduled maintenance must be performed by a qualified forklift technician at the intervals indicated.

If any problem affecting safety is noted, it must be repaired immediately by a trained forklift technician. The truck must not be operated until such repairs are complete. This list does not cover attachments or special equipment from other manufacturers. Refer to the respective manufacturer's documentation for maintenance information pertaining to such items.

A checklist such as the one illustrated may be helpful in performing daily inspection. The checklist illustrated is intended for a range of pallet truck types, so some items may not apply.

#### **WARNING**

To prevent accidents during maintenance activities, the truck must be secured against unintentional movement or start-up.

Before beginning any maintenance, the forks should be fully lowered, and the key switch turned off. The truck must remain in this state throughout the maintenance process except for individual maintenance activities that specifically require otherwise.

#### **Check for Fluid Leakage**

Check the entire truck as well as the surface beneath it for signs of fluid leakage.

#### **Check Forks and Chassis**

Inspect the forks, chassis, and if equipped, the load back rest for deformity, cracks, or other damage.

#### **Check Battery Connector**

Disconnect and reconnect the battery to confirm smooth operation. Inspect the battery connector and its cables for damage.

#### **Check Battery Retention**

Check the battery retaining plates or other mechanism. Battery retention devices must be undamaged and in proper position.

#### **Check Decal Condition**

Inspect all decals and the data/capacity plate for condition and legibility. Decal locations are given in the Overview section of this manual. Any damaged or unreadable decals must be replaced.

#### **Check Control Handle Pivot and Tilt**

Check the pivot point where the control handle attaches to the support column for smooth operation by moving the handle through its entire range. On manual steer models, unlock the tilt adjustment handle and tilt the column through its full range while checking for smooth movement. Ensure the tilt adjustment handle locks securely.

#### **Check Travel Control**

Rotate the travel control mechanism in forward and reverse. Check for smooth operation and strong spring return to neutral.

#### Perform Operational Check

Before returning the truck to service, perform an operational check of the following items:

- Parking brake
- Multi-function display/battery discharge indicator
- Horn
- · Forward and reverse travel
- · Counter-current braking (plugging)
- Lift and lower function (operate through complete range of motion)
- Working lights (if equipped)

#### 

Excessive noise during hydraulic function operation indicates low hydraulic fluid.

This condition must be checked and corrected immediately to avoid damage to the hydraulic pump.





## **Routine Lubrication and Inspection**

## Routine Lubrication and Inspection Intervals

The items in this section must be performed based on usage and environment. They do not need to be performed daily but may require completion more frequently than the major scheduled maintenance intervals. These intervals can often be based on maintenance experience by those familiar with equipment in the given environment. Intervals given herein for specific items however must not be exceeded in any case. Your Linde dealer will be able to provide application-specific interval recommendations if required.

#### Minimum Lubrication and Inspection Intervals

Item	At least ev- ery:
Check casters. Lubricate axles if greasable option is present.	50 hours
Grease the load wheel axles if greasable option is present.	50 hours
Check for gear oil leakage.	200 hours
Check the lift cylinder and lines for leaks.	200 hours
Check the hydraulic oil level.	200 hours
Check wheel fasteners and tighten if necessary.	200 hours
Lubricate the drive unit swivel bearing at its two grease fittings.	200 hours
Lubricate the tie bar linkage.	200 hours
Lubricate the lift cylinder and fork frame pivot pins.	200 hours
Lubricate caster swivel bearings.	200 hours
Lubricate the teeth of the steering gear (optional electric steer only).	200 hours

## 5 Maintenance

#### **Routine Lubrication and Inspection**

#### **Check Casters**

Inspect casters for damge to wheels or excess wobble. Repair as required.

## 

*Do not lubricate the caster swivel bearings at 50 hours. This is done at 200 hours.* 

Casters may have greaseable axles as an option. If so, lubricate the axles at the grease fitting (1) on the end of each axle. This fitting is not present with standard axles.



### Lubricate Load Wheel Axles

Raise the forks and lubricate the load wheel axles at the axle grease fittings (1).

## 

If no grease fittings is present, the truck is equipped with sealed load wheel bearings and lubrication is not required.

## Check for Gear Oil Leakage

Examine the drive unit for signs of leakage. Replace seals and check oil level if required.

## Check Lift Cylinder and Lines for Leaks

Operate the lift function and observe the lift cylinder and its hose for leakage or loose mounting.

### **Check Hydraulic Oil Level**

Lower the forks completely and verify that there is adequate oil in the reservoir. Level should be approximately 3/4 inch (19 mm) below the bottom of the filler plug opening. Add hydraulic oil as necessary. See the Fluid and





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Lubricant Specifications section for oil specifications.

#### **Check Drive Wheel and Fasteners**

#### **WARNING**

Uneven wear or excessive damage to the tires can reduce stability as well as brake performance. Reduced stability can cause loss of control. Reduced brake performance can cause collisions.

Have worn or damaged tires changed immediately.

Inspect the drive tire for damage or excessive wear.

Check drive wheel mounting hardware for looseness. This is especially important if a wheel has recently been removed and reinstalled for repairs, replacement, or any other reason. Have any loose wheel mounting hardware tightened to the following torque before operation.

#### **WARNING**

Wheel mounting hardware sometimes requires several cycles of tightening before it fully seats. For this reason, wheel mounting screws or nuts will often work loose in the period immediately following initial tightening.

Whenever a wheel is removed and replaced for any reason, the wheel mounting screws or nuts must be checked for tightness every 10 hours thereafter until no further loosening is detected.

Drive Wheel Fastener Torque	
144 ft-lbs (195 Nm)	

## Lubricate Drive Axle Swivel Bearing

Lubricate the bearing at the two grease fittings (1) on either side of the drive motor. Jack up the truck so the drive wheel is clear of the floor and rotate the drive unit as the fittings are lubricated.

Manual Steer







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### Lubricate Tie Bar Linkage

Lubricate the tie bar linkage of each fork at the grease fittings of the toggle pivot (1 and 2), each end of the tie bar (3 and 4), and the shackle pivot (5). Access to 1, 2, and 4 is from beneath.

#### **Tie Bar Lubrication Points**







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### Lubricate Lift Cylinder and Fork Frame Pivots

Lubricate the upper fork frame pivots at the four grease fittings (1).

Lubricate the upper and lower lift cylinder pivots at their grease fittings (2).



### Lubricate Caster Swivel Bearings

Lubricate the swivel bearing on each caster at the grease fitting (1) on the caster body.



## Lubricate Steering Gear (Electric steer only)

On trucks equipped with electric steering, hand lubricate the steering ring gear (1) on the drive unit.

#### A WARNING

The steer motor can operate suddenly if the truck is switched on and the handle is moved. This will result in a pinch point at the steering motor pinion.

Always switch the truck off and disconnect the battery before working on or around the drive unit or steer motor unit.





## Scheduled Maintenance

#### **General Maintenance Information**

This section contains all information required to determine when the truck must be serviced and what must be done. This information is presented as scheduled maintenance charts on the following pages. Be sure to perform maintenance within the time limit given in the maintenance charts. Proper and timely maintenance is essential to obtain the full operability, performance and service life from the truck, and is a prerequisite for any warranty claims.

#### **Maintenance Intervals**

Maintenance intervals are based on operating hours but are also subject to the maximum intervals (based on years in service) listed at the top of each chart.

All lubrication and service intervals must be reduced for dusty conditions, large temperature fluctuations or intensive use.

#### **Scheduled Maintenance Charts**

The scheduled maintenance charts provide a list of maintenance tasks and associated time intervals at which they must be carried out. Tasks listed under successive intervals are not cumulative; only the additional tasks required are listed under successive intervals.

Use only high-quality lubricants or other materials meeting the specifications listed in Fluid and Lubricant Specifications. All work must be performed only by qualified forklift technicians. Custom-fitted equipment is not covered by the scheduled maintenance charts. If such equipment is installed, refer to the manufacturer's documentation for maintenance requirements.



#### **Scheduled Maintenance**

#### **Maintenance Schedule**



#### Maintenance every 1000 hours, but at least every 12 months.

#### Preparations

Clean the truck (as required).

Read and clear the error memory.

Enter the next service interval.

#### Drive motor

Check that the cables and harnesses are correctly routed and in good condition.

#### Gear unit

Check the gear oil level.

#### Chassis

Visually check the general condition of the chassis and forks.

Check tire condition.

#### Controls

Check the operation of the travel control mechanism.

#### Electrical system

Clean the electrical panel and controller power terminals with compressed air.

Check tightness of the line contactor power terminals. Check contactor tips and clean or replace as required.

Check condition/secure positioning of cables, wiring, connections and connectors.

Check the battery condition, acid level and acid density.

Check drive motor, gearbox, and control handle mounting.

#### Hydraulic system

Clean the breather on the hydraulic pump unit. Unscrew the breather, clean with solvent, then dry with compressed air. Reinstall 2-3 turns past finger-tight.

Change the hydraulic oil.

Check the pump unit for noises, leaks, and proper operation.

Check the brush length and condition on the pump unit motor.

Check lift cylinder height adjustment. Verify forks are parallel to ground when lowered.

#### Fork lifting mechanism

Check lift limit switch by verifying the pump motor stops when forks reach maximum height.

#### Subsequent tasks

Carry out functional test and test drive.

Attach maintenance sticker.

#### Maintenance every 2000 hours, but at least every 12 months.

#### Preparations



#### Fluid and Lubricant Specifications

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Read and clear the error memory.

Enter the next service interval.

Gear unit

Change the gear oil.

Subsequent tasks

Carry out functional test and test drive.

Attach maintenance sticker.

## Fluid and Lubricant Specifications

#### Hydraulic Oil

#### Original equipment specification

The following grades of hydraulic oil are supplied from the factory as original equipment:

ISO-L-HM 68 as per ISO 6743-4 for standard trucks ISO-L-HM 15 as per ISO 6743-4 for freezer trucks ISO-L-HM 32 as per ISO 6743-4 for cooler trucks

#### Gear Oil

SAE 80W-90 API GL5, multi-purpose gear oil, MIL-L-2105 or equivalent.

#### Grease

Lithium-based grease with MoS2.



Do not mix non-lithium-based greases with lithium-based greases.

## Capacities

Assembly	Fluid or Lubricant	Capacity	
Hydraulic system	Hydraulic oil	1.7 qts (1.6 l)	
Transmission	Gear oil	1.9 qts (1.8 l)	

#### Troubleshooting



## Troubleshooting

#### **Fuses**

The standard truck has one main power fuse (1F1) mounted directly to the drive motor controller. Control fuses are contained in a housing directly above the controller. Trucks equipped with the optional electric steering system will have an additional fuse (3F1). All fuses are mounted on the right-hand side of the chassis. Fuses are described in the table.

#### 

The motor fuse carries very high currents which can cause fire or injury if inappropriately handled or incorrectly installed.

Only trained service personnel should inspect or replace these fuses. The specific installation sequence of cables, hardware, and fuses onto the fuse terminals is vital to proper functioning of the fuses. Incorrect installation sequence of these parts can cause premature fuse failure, overheating, or fire.

#### **Fuse Location**



#### Main Fuses

- 1F1 (250A) (300A for EE) Drive motor and the power circuit side of the main control unit
- 3F1 (40A) (35A for EE) Steering unit (electric steer only)

#### **Control Fuses**

- F1 (4A) Options at X9
- F2 (4A) Speed sensor B1
- 1F2 (4A) Solenoid driver pin 1X1:4 on drive controller
- 1F3 (10A) Key switched circuits
- 1F4 (4A) Control buttons; Display unit
- 3F2 (4A) Control voltage to steer unit (electric steer only)
- 8F1 (4A) Electro-magnetic brake Y1
- Empty Position open; may be used for non-standard option



#### Troubleshooting

#### **Diagnostic Connector**

The diagnostic connector (1) is located in a bracket adjacent to the hydraulic pump unit. It provides an interface between the main controller and diagnostic software on a hand programming unit or laptop computer. The software allows review/editing of performance parameters, readout of fault codes, and resetting of maintenance intervals.



#### Maintenance Intervals

The truck control system has the capability to store a programmed maintenance interval. When the operating hours on the truck reach this programmed value, the wrench symbol on the indicator unit will begin flashing. When this occurs, the maintenance interval value must be increased to the next desired maintenance interval to clear the fault. This requires connecting a hand held programming unit or a laptop containing the appropriate software to the diagnostic plug and then resetting the value. The procedure is explained in the service manual.

## 5 Maintenance

Troubleshooting


6

# Specifications



**Specifications - Manual Steer** 

### **Specifications - Manual Steer**



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#### Specifications - Manual Steer

General	ECR30	ECR40
Manufacturer	Linde	Linde
Manufacturer's model designation	ECR30	ECR40
Drive type	Electric	Electric
Operation: manual, accompanied, standing, seated, order picking	Standing	Standing
Nominal load capacity (May be downrated for certain masts or attach- ments. Always refer to vehicle data plate.)	6000 lbs (2700 kg)	8000 lbs (3600 kg)
Load distance (x)	See fork table	See fork table
Wheelbase (y)	See fork table	See fork table

Weights	ECR30	ECR40
Service weight	Refer to vehicle data plate	Refer to vehicle data plate

Wheels and tires	ECR30	ECR40
Tire type, drive/load/caster	Cushion/ poly/poly	Poly/ poly/poly
Tire size, drive (dia. x width x rim dia.)	12x5x8 in	12x5x8 in
Tire size, load (outside dia.)	3.25 in	3.25 in
Number of wheels, front / rear (x = driven)	1x/2	1x/2
Track width, front (casters) (b10)	23.1 in (586 mm)	23.1 in (586 mm)
Track width, rear (load) (b11)	See Dimensions table	See Dimensions table

Dimensions	ECR30	ECR40
Fork height, lowered (h13)	3.3 in (84 mm)	3.3 in (84 mm)
Maximum lift height from floor (MFH)	9.3 in (236 mm)	9.3 in (236 mm)
Lift stroke (h3)	6.0 in (152 mm)	6.0 in (152 mm)
Extended height (h4)	62.5 in (1587 mm)	62.5 in (1587 mm)
Handle height, maximum (h14)	64.4 in (1636 mm)	64.4 in (1636 mm)
Platform height (h7) lowered / raised (nominal)	5.1 in / 11.1 in (130 mm) / (283 mm)	5.1 in / 11.1 in (130 mm) / (283 mm)
Ground clearance, mid-fork (m2)	1.03 in (26.2 mm)	1.03 in (26.2 mm)
Fork thickness, mid-fork (s)	2.3 in (57.7 mm)	2.3 in (57.7 mm)

#### 6 Specifications



#### **Specifications - Manual Steer**

Dimensions	ECR30	ECR40
Overall length (I1)	See fork table	See fork table
Load wheel distance (x)	See fork table	See fork table
Wheelbase (y)	See fork table	See fork table
Chassis length (I2)	61.7 in (1567 mm)	61.7 in (1567 mm)
Operator compartment length (OC)	18.1 in (459 mm)	18.1 in (459 mm)
Overall width (b1)	34.4 in (873 mm)	34.4 in (873 mm)
Fork spread (b5) standard / optional	23 / 28 in (584 / 711 mm)	28 / 33 in (711 / 838 mm)
Track width, rear (b11) standard / optional	13 /18 in (329 / 457 mm)	18 / 23 in (457 / 584 mm)
Fork width (e)	10 in (254 mm)	10 in (254 mm)
Turning radius (Wa)	See fork table	See fork table

Fork Lengths - ECR 30 and ECR 40 (Single Load Wheels)				
Fork length (L)	Load wheel distance (X)	Wheelbase (y1/y2) low- ered/raised	Turning radius (Wa) lowered/ raised	Overall length (L1)
48.4 in (1229 mm)	40.9 in (1039 mm)	92.5 / 89.7 in (2349/2278 mm)	102.5 / 99.7 in (2604/2533 mm)	109.6 in (2784 mm)
96.4 in (2448 mm)	61.4 in (1559 mm)	113.0 / 110.2 in (2870/2799 mm)	123.0 / 120.2 in (3125/3054 mm)	157.6 in (4003 mm)

Performance data	ECR30	ECR40
Travel speed, rated load / no load	6.4 / 9.5 mph (10.3 / 15.2 km/h)	5.9 / 9.5 mph (9.6 / 15.2 km/h)
Acceleration, rated load / no load	6.4 / 5.1 seconds	6.8 / 5.1 seconds
Gradeability, * rated load / no load	15 / 15%	10/ 15%
Service brake type	electromagnetic	electromagnetic
* Gradeability is a measure of tractive ability only. The chassis will not clear a 15% transition.		

Drive Motor and Battery	ECR30	ECR40
Drive motor power rating (60 min)	5.4 hp (4.0 kW)	5.4 hp (4.0 kW)
Battery voltage	24 V	24 V
Maximum battery capacity (6h)	750 Amp-hr	750 Amp-hr



#### Specifications - Manual Steer

Drive Motor and Battery	ECR30	ECR40
Battery compartment length (BC)	13.5 in (341 mm)	13.5 in (341 mm)
Battery compartment width (b7)	31.5 in (796 mm)	31.5 in (796 mm)
Minimum battery weight	900 lbs (408.24 kg)	900 lbs (408.24 kg)
Maximum battery weight	1500 lbs (680.4 kg)	1500 lbs (680.4 kg)



**Specifications - Electric Steer** 

### **Specifications - Electric Steer**





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General	ECR30	ECR40
Manufacturer	Linde	Linde
Manufacturer's model designation	ECR30	ECR40
Drive type	Electric	Electric
Operation: manual, accompanied, standing, seated, order picking	Standing	Standing
Nominal load capacity (May be downrated for certain masts or attach- ments. Always refer to vehicle data plate.)	6000 lbs (2700 kg)	8000 lbs (3600 kg)
Load distance (x)	See fork table	See fork table
Wheelbase (y)	See fork table	See fork table

Weights	ECR30	ECR40
Service weight	Refer to vehicle data plate	Refer to vehicle data plate

Wheels and tires	ECR30	ECR40
Tire type, drive/load/caster	Cushion/ poly/poly	Poly/ poly/poly
Tire size, drive (dia. x width x rim dia.)	12x5x8 in	12x5x8 in
Tire size, load (outside dia.)	3.25 in	3.25 in
Number of wheels, front / rear (x = driven)	1x/2	1x/2
Track width, front (casters) (b10)	23.1 in (586 mm)	23.1 in (586 mm)
Track width, rear (load) (b11)	See Dimensions table	See Dimensions table

Dimensions	ECR30	ECR40
Fork height, lowered (h13)	3.3 in (84 mm)	3.3 in (84 mm)
Maximum lift height from floor (MFH)	9.3 in (236 mm)	9.3 in (236 mm)
Lift stroke (h3)	6.0 in (152 mm)	6.0 in (152 mm)
Extended height (h4)	62.5 in (1587 mm)	62.5 in (1587 mm)
Handle height, maximum (h14)	56.1 in (1425 mm)	56.1 in (1425 mm)
Platform height (h7) lowered / raised (nominal)	5.1 in / 11.1 in (130 mm) / (283 mm)	5.1 in / 11.1 in (130 mm) / (283 mm)
Ground clearance, mid-fork (m2)	1.03 in (26.2 mm)	1.03 in (26.2 mm)
Fork thickness, mid-fork (s)	2.3 in (57.7 mm)	2.3 in (57.7 mm)

#### 6 Specifications



Dimensions	ECR30	ECR40
Overall length (I1)	See fork table	See fork table
Load wheel distance (x)	See fork table	See fork table
Wheelbase (y)	See fork table	See fork table
Chassis length (I2)	61.7 in (1567 mm)	61.7 in (1567 mm)
Operator compartment length (OC)	16 in (405 mm)	16 in (405 mm)
Overall width (b1)	34.4 in (873 mm)	34.4 in (873 mm)
Fork spread (b5) standard / optional	23 / 28 in (584 / 711 mm)	28 / 33 in (711 / 838 mm)
Track width, rear (b11) standard / optional	13 /18 in (329 / 457 mm)	18 / 23 in (457 / 584 mm)
Fork width (e)	10 in (254 mm)	10 in (254 mm)
Turning radius (Wa)	See fork table	See fork table

Fork Lengths - ECR 30 and ECR 40 (Single Load Wheels)				
Fork length (L)	Load wheel distance (X)	Wheelbase (y1/y2) low- ered/raised	Turning radius (Wa) lowered/ raised	Overall length (L1)
48.4 in (1229 mm)	40.9 in (1039 mm)	92.5 / 89.7 in (2349/2278 mm)	102.5 / 99.7 in (2604/2533 mm)	109.6 in (2784 mm)
96.4 in (2448 mm)	61.4 in (1559 mm)	113.0 / 110.2 in (2870/2799 mm)	123.0 / 120.2 in (3125/3054 mm)	157.6 in (4003 mm)

Performance data	ECR30	ECR40
Travel speed, rated load / no load	6.4 / 9.5 mph (10.3 / 15.2 km/h)	5.9 / 9.5 mph (9.6 / 15.2 km/h)
Acceleration, rated load / no load	6.4 / 5.1 seconds	6.8 / 5.1 seconds
Gradeability, * rated load / no load	15 / 15%	10/ 15%
Service brake type	electromagnetic	electromagnetic
* Gradeability is a measure of tractive ability only. The chassis will not clear a 15% transition.		

Drive Motor and Battery	ECR30	ECR40
Drive motor power rating (60 min)	5.4 hp (4.0 kW)	5.4 hp (4.0 kW)
Battery voltage	24 V	24 V
Maximum battery capacity (6h)	750 Amp-hr	750 Amp-hr



Drive Motor and Battery	ECR30	ECR40
Battery compartment length (BC)	13.5 in (341 mm)	13.5 in (341 mm)
Battery compartment width (b7)	31.5 in (796 mm)	31.5 in (796 mm)
Minimum battery weight	900 lbs (408.24 kg)	900 lbs (408.24 kg)
Maximum battery weight	1500 lbs (680.4 kg)	1500 lbs (680.4 kg)

#### 6 Specifications





### В

Battery	
connecting and disconnecting	42
connecting to charger	42
Battery acid, safety information	11
Battery, changing	44
Before operation.	6
Brake system	34

### С

California Health & Safety Code	П
Capacities, fluids and lubricants	61
Capacity, load	
lifting	26
Casters, lubrication 54,	58
Changing the battery	44
Cleaning the truck.	50
Commissioning, new truck.	28
Connecting the battery	42
Control handle	
operating range	30
steering with	32
Controls	
direction and travel	30
fork lift and lower buttons	36
horn button	33
key switch	29

### D

Daily maintenance inspection	51
Data plate 12,	26
Description, technical.	16
Diagnostic connector.	63
Dimensions	
electric steer.	70
manual steer	66
Disconnecting the battery	42
Display unit	22
Drive axle swivel bearing, lubrication	56
Drive wheel fasteners	
tightening	55
torque specification	55
Driving	30
E	
Electric braking	34

### F

Fluid capacities	61
Fluid specifications.	61
Fork frame pivots, lubrication.	58
Fuses	62

### G

Gear oil	
capacity	61
specifications.	61
Grease, specification.	61
н	
Hazardous substances	10
Horn	33
Hydraulic oil	
capacity	61
safety information	11
specifications	61

### I

Inclines, Ramps, Docks, Elevators	7
Indicator unit	22

#### L

Lift cylinder pivots, lubrication	58
Lifting	36
Lifting capacity	26
Load capacity	
lifting	26
Load wheel axles, lubrication	54
Lowering the forks.	36
Lubricants	
capacities	61
specifications	61
Lubrication	
Casters 54,	58
Drive axle swivel bearing	56
Fork frame pivots	58
Lift cylinder pivots.	58
Load wheel axles.	54
Steering gear	58
Tie bar linkage	57
Lubrication, routine intervals.	53



#### Μ

Maintenance	
general information	59
interval information	59
Maintenance schedule	60

### Ν

New truck, preparing for operation	28
------------------------------------	----

## 0

Olis	
capacities	61
safety information	10
specifications	61
Order picking system (optional equipment)	
Electric steer	40
Manual steer	38

#### Ρ

Parking	8
Parking brake	35
Personnel qualifications for maintenance.	
10,	50
Preventive maintenance schedule	60
Proposition 65	Ш

### Q

Qualifications for maintenance personnel.	
10,	50

### R

Raising the forks	36
Regenerative braking	34

### S

Scheduled maintenance charts Scheduled maintenance (see also Mainte- nance)	60
charts	59
general information.	59
Shut-down procedure	29
Specifications	
electric steer.	70
fluids and lubricants	61
manual steer	66
Start-up procedure	29
Static-return-to-neutral.	29
Steering.	32
Steering gear, lubrication.	58
Symbols, display unit	22
<b>-</b>	

#### Т

Tie bar linkage, lubrication	57
Tires, inspection.	55
Torque specification, drive wheel fasteners.	55
Towing the truck.	47
Transmission, oil for	
capacity	61
specifications	61
V	
Voltage decal	13
W	
Wheel fasteners, drive	
tightening	55

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1102-02 series ECR - 11028011640 rv03 US - 04/2020